Data on Arctic Charr, *Salvelinus alpinus* (L.), from the Meliadine River, Northwest Territories, 1990

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ABSTRACT

McGowan, D.K. 1992. Data on Arctic charr, Salvelinus alpinus (L.), from the Meliadine River, Northwest Territories, 1990. Can. Data Rep. Fish. Aquat. Sci. 867: iv + 9 p.

A weir, or counting fence, was used to enumerate the upstream migration of Arctic charr on the Meliadine River, Rankin Inlet area, in 1990. The daily length-frequency distribution of charr and number counted are presented. Biological data collected includes length, weight, age and maturity characteristics from a subsample stratified by length.

Key words: counting fence; length-frequency; weirs; statistical sampling.

RÉSUMÉ

McGowan, D.K. 1992. Data on Arctic charr, Salvelinus alpinus (L.), from the Meliadine River, Northwest Territories, 1990. Can. Data Rep. Fish. Aquat. Sci. 867: iv + 9 p.

Une pêche en fascines, ou barrière de comptage, a été utilisée pour dénombrer les ombles chevaliers qui ont remonté le cours de la rivière Meliadine, dans la région de Rankin Inlet, en 1990. La distribution quotidienne de la fréquence des longueurs des ombles et le nombre de sujets énumérés est donné. On a recueilli des données biologiques - longueur, poids, âge et maturité - à partir d'un sous-échantillon stratifié selon la longueur.

Most-clés: barrière de comptage; fréquence des longueurs; pêche en fascines; échantillonage statistique.

INTRODUCTION

A decline in the commercial catch of Arctic charr from the Diana River stocks led to the closure of the Rankin Inlet fishery in 1985 (McGowan 1987). Designated domestic fishing areas outlined in Fig. 1 have been closed to commercial fishing since 1983. Subsequently, a biological investigation was conducted on the Diana River in 1986 to determine the status of the stock (McGowan 1987). A similar investigation was planned on the Diana River in 1990 to determine if the stock had recovered since the closure was invoked. Unusually heavy rainfall in July and August 1990 raised the discharge in the Diana River to a level that forced the cancellation of the study. Equipment and personnel already located at Rankin Inlet were then moved to the nearby Meliadine River (Fig. 1). Rankin Inlet residents utilize the Meliadine River for domestic (subsistence) and sport fishing. A weir, or counting fence, described by McGowan (1987), was then used to enumerate the upstream migration of Arctic charr in the Meliadine River. This report presents the data collected from this study.

MATERIALS AND METHODS

FISH WEIR

The weir site was located approximately 1.0 km upstream from the mouth of the Meliadine River (Fig. 1). Installation of the weir and trap was completed on 22 August and counting continued until 10 September 1990. Upon completion of the study, the weir and trap were removed from the river.

The design and construction of the weir and trap are described by McGowan (1987).

BIOLOGICAL DATA

All species of fish passing through the trap were counted and released. Charr passing through the trap were live sampled for fork length (±1 mm), round weight (±50 g), and released. Charr were sampled throughout the day whenever they were present in the trap. Other species encountered were counted and released.

A small subsample of charr, stratified by length, was sacrificed to determine the age-length relationship. Where possible, five charr per 50 mm length interval were selected and dispatched. These charr were sampled for fork length (±1 mm), round weight (±50 g), sex and stage of maturity (Appendix 1), and the sagittal otoliths were removed for age purposes. Age was estimated following the method described by Grainger (1953).

The relative condition factor (K), a measure of the "robustness" of the fish, was determine by the formula:

$$K = \frac{W \times 10^5}{L^3}$$

where: W = weight in grams
L = length in mm

DATA ANALYSIS

Data were analyzed using computer facilities (Micro Vax II) based at the Freshwater Institute, Winnipeg, Mb. The Statistical Analysis System (version 6) was used to generate length, weight, age, sex and maturity summaries. The graph representing the daily number of enumerated charr was produced on an IBM compatible PC computer using Quattro Pro (version 3.0). The map was produced on an IBM compatible PC using Corel Draw (version 2.0).

RESULTS

Table 1 summarizes the number of Arctic charr live sampled, the length-frequency distribution and the number counted per day at the Meliadine River. Biological data by age group and length interval from the sacrificed sample of Arctic charr are shown in Tables 2-3. Age data are not considered representative of the population because the sample was stratified by length. Biological data by length interval for Arctic charr live sampled are shown in Table 4. The mean fork length of the live sampled Arctic charr was 429 mm (N=895). Figure 2 graphically represents the daily number of Arctic charr enumerated. Table 5 summarizes the other species counted per day through the fish weir. Other species encountered included Arctic grayling, Thymallus arcticus (Pallas) (N=127); cisco Coregonus artedii Lesueur (N=121); lake trout, Salvelinus naymaycush (Walbaum) (N=5).

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Klapecki and Rankin Inlet residents P. Karlik and J. Anawak. Thanks are also intended to R. Gow, Department of Economic Development and Tourism, Government of the Northwest Territories, Rankin Inlet, for his assistance in constructing the weir. The sampled charr were aged by G. Carder. Typing of the final report was done by Karla DeCaigny. A.H. Kristofferson reviewed an earlier draft of this report.

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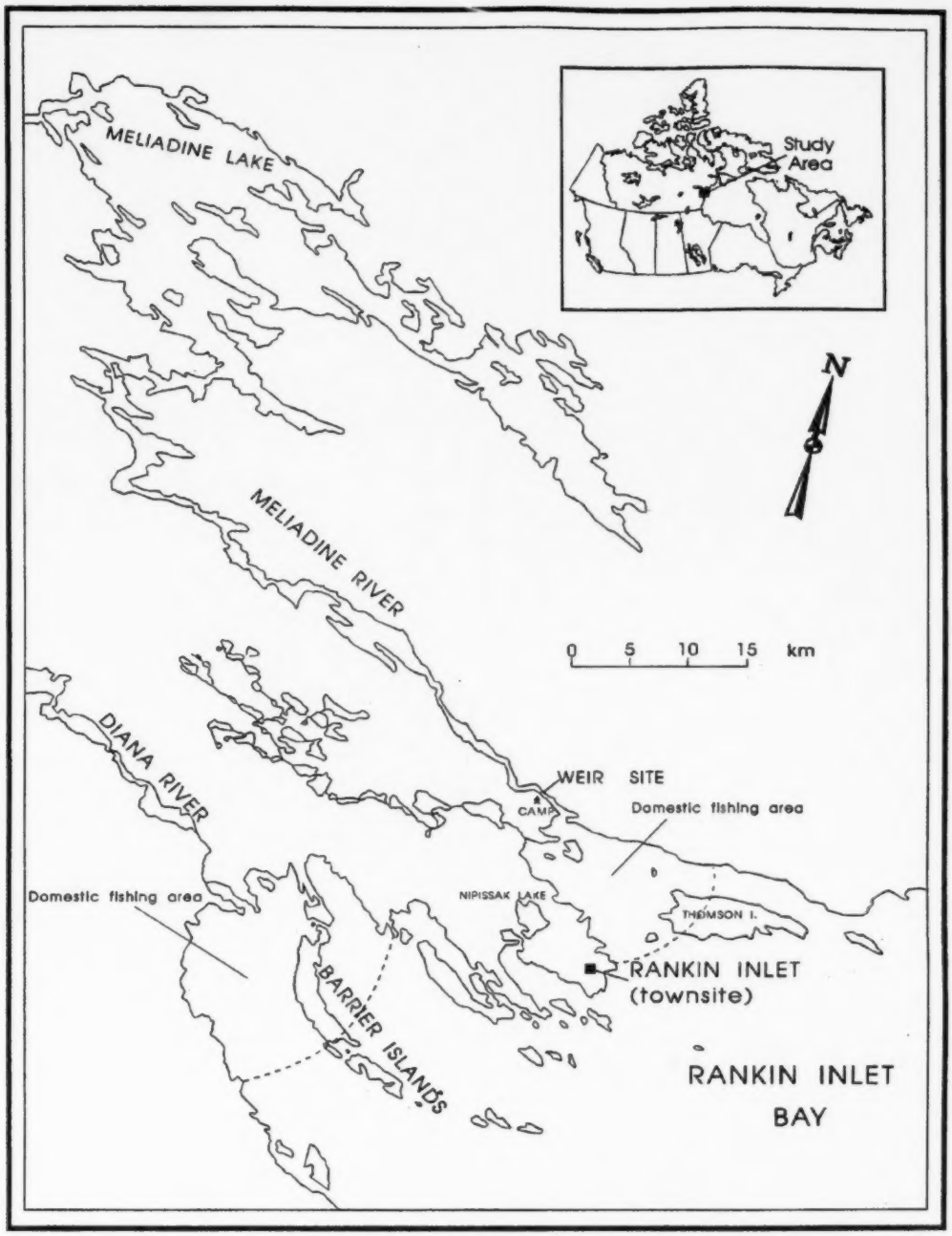


Fig. 1. Map of the Meliadine River showing the location of the fish weir and camp, 1990.

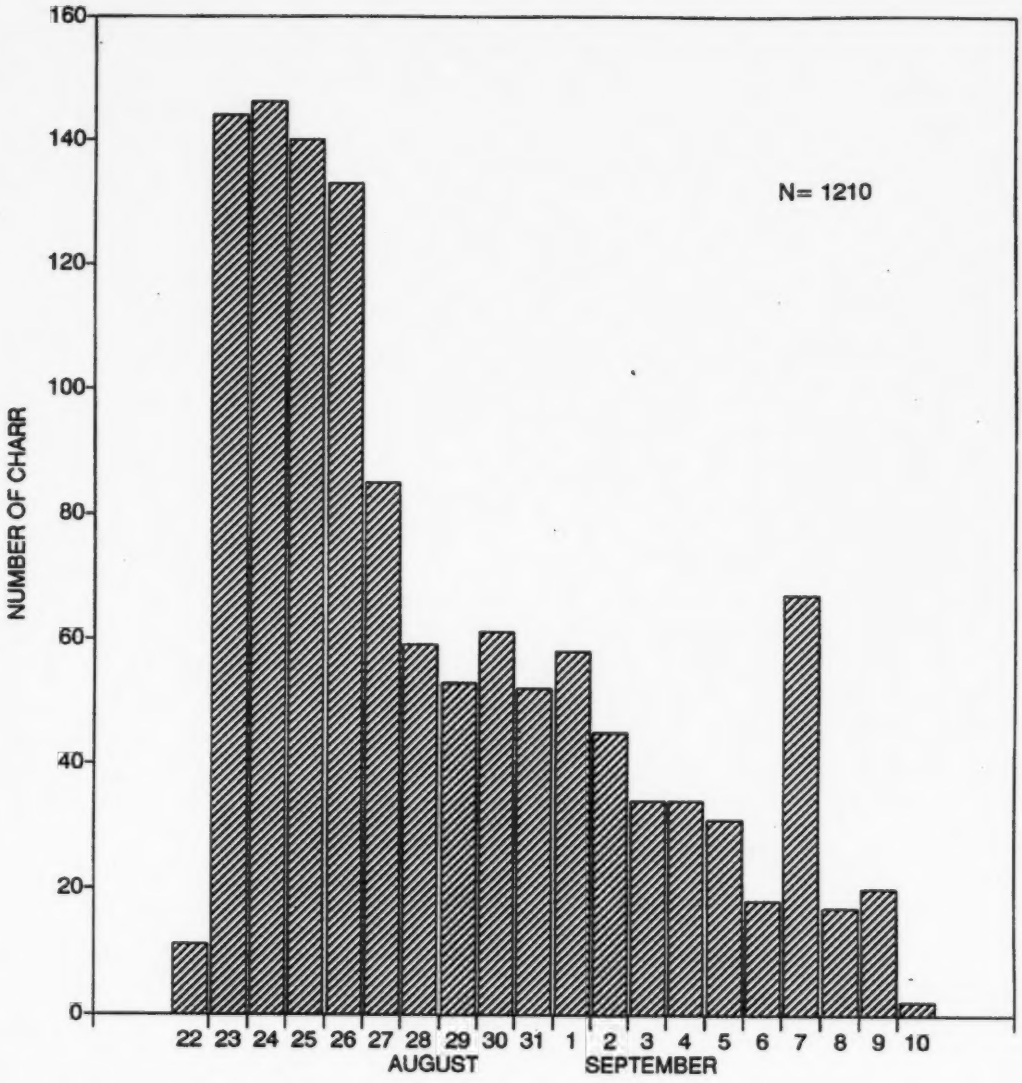


Fig. 2. Daily counts of Arctic charr migrating upstream through the fish weir, Meliadine River, 1990.

Table 1. Summary of the number of Arctic charr live sampled, the length-frequency distribution and the number counted per day, Meliadine River fish weir, 1990.

Date	Number Sampled	Length Interval (mm)														Daily Count
		150	200	250	300	350	400	450	500	550	600	650	700	750	800	
August 22	11				1		2	7		1						11
23	75				2	2	18	24	18	6	4	1				144
24	69			1	4	6	16	18	18	4	2					146
25	92				3	9	28	27	10	11	4					140
26	90				6	12	21	23	19	5	1	3				133
27	72			2	12	11	20	10	11	3	3					85
28	57			1	8	18	7	14	5	1	3					59
29	50				8	11	15	7	6		2	1				53
30	59			4	14	12	14	8	3	3		1				61
31	51		1	3	11	11	13	4	4	4						52
September 1	58		1	4	11	11	12	9	6	4						58
2	44		1	8	9	9	9	2	4	1	1					45
3	29			3	7	8	7	3	1							34
4	34			6	16	4	4		3			1				34
5	31			1	7	14	4	3		2						31
6	18				2	7	3	3	2				1			18
7	45		2	10	14	12	1	3	2				1			67
8	8				3	3	1							1		17
9	0															20
10	2															2
Total	895		5	43	138	160	195	165	113	46	20	8	1	1		1210

Table 2. Biological data by age group from the sacrificed sample of Arctic charr stratified by length, Meliadine River fish weir 22 August to 10 September 1990.

Age (yr)	Males N	Males Length(mm) Mean	Males Length(mm) SD	Males Weight(g) Mean	Males Weight(g) SD	Males K	Males % Mat	Females N	Females Length(mm) Mean	Females Length(mm) SD	Females Weight(g) Mean	Females Weight(g) SD	Females K	Females % Mat	Combined N	Combined Length(mm) Mean	Combined Length(mm) SD	Combined Weight(g) Mean	Combined Weight(g) SD	Combined K	Combined % Mat
3	1	248	-	167	-	1.09	0	3	241	19	157	41	1.10	0	4	243	15	160	34	1.10	0
4	1	280	-	272	-	1.24	0	2	271	56	245	173	1.11	0	4	302	65	378	268	1.19	25
5	3	350	20	576	109	1.33	0	2	319	20	408	134	1.23	0	5	337	24	509	138	1.29	0
6	-	-	-	-	-	-	-	3	306	78	409	346	1.22	0	3	306	78	409	346	1.22	0
7	2	470	30	1383	165	1.33	0	-	-	-	-	-	-	-	3	453	37	1228	293	1.31	33
8	1	556	-	2050	-	1.19	100	2	399	194	1032	1158	1.19	0	3	451	164	1371	1008	1.19	33
9	-	-	-	-	-	-	-	4	540	53	2050	534	1.30	0	4	540	53	2050	534	1.30	0
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	600	-	2600	-	1.20	100
11	1	523	-	1750	-	1.22	0	-	-	-	-	-	-	-	1	523	-	1750	-	1.22	0
13	1	580	-	2700	-	1.38	100	-	-	-	-	-	-	-	1	580	-	2700	-	1.38	100
TOTAL	10							16							29						

Table 3. Biological data from the sacrificed sample of Arctic charr stratified by length, Meliadine River fish weir 22 August to 10 September 1990.

Length Interval (mm)	Males N	Males Length(mm) Mean	Males Weight(g) Mean	Males Weight(g) SD	Males K	Males % May	Females N	Females Length(mm) Mean	Females Weight(g) Mean	Females Weight(g) SD	Females K	Females % Mat	Combined N	Combined Length(mm) Mean	Combined Weight(g) Mean	Combined Weight(g) SD	Combined K	Combined % Mat
200	1	248	167	-	1.09	0	3	232	132	21	1.06	0	4	236	141	25	1.07	0
250	1	280	272	-	1.24	0	4	261	208	17	1.17	0	5	265	220	32	1.18	0
300	1	328	457	-	1.30	0	3	316	394	98	1.23	0	4	319	410	86	1.25	0
350	2	361	635	52	1.35	0	2	391	780	40	1.31	50	4	376	707	92	1.33	25
400	1	449	1266	-	1.40	0	1	418	918	-	1.26	100	2	434	1092	246	1.33	50
450	1	491	1500	-	1.27	0	1	474	1550	-	1.46	0	2	483	1525	35	1.36	0
500	1	523	1750	-	1.22	0	2	530	1925	106	1.30	0	3	528	1867	126	1.27	0
550	3	574	2283	362	1.20	100	2	580	2325	672	1.18	0	5	577	2300	423	1.19	60
600	-	-	-	-	-	-	-	-	-	-	-	-	1	600	2600	-	1.20	100
TOTAL	11						18						30					

Table 4. Biological data by length interval for Arctic charr live sampled from the Meliadine River fish weir 22 August to 10 September 1990.

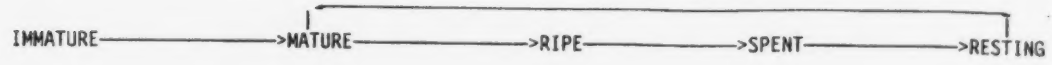
Length Interval (mm)	No.	Percent	Mean Fork Length (mm)	Round Weight(g) Mean	SD	K
200	5	1	230	110	55	0.91
250	43	5	277	228	64	1.06
300	138	15	331	458	105	1.26
350	160	18	375	677	154	1.27
400	195	22	426	1005	158	1.30
450	165	18	472	1401	179	1.33
500	113	13	520	1877	251	1.33
550	46	5	570	2528	362	1.36
600	20	2	617	3030	275	1.29
650	8	1	671	3950	513	1.31
700	1	0	710	5400	-	1.51
750	1	0	783	5950	-	1.24
TOTAL	895					
MEAN			429	1163	756	1.29

Table 5. Summary of other species counted per day, Meliadine River fish weir, 1990.

Date		Arctic grayling	cisco	lake trout
August	22	4	2	-
	23	5	16	-
	24	4	12	-
	25	2	3	-
	26	11	6	-
	27	14	3	-
	28	26	8	1
	29	4	2	-
	30	11	11	1
	31	10	2	-
September	1	9	0	-
	2	8	4	-
	3	8	2	-
	4	2	1	-
	5	1	18	2
	6	3	7	-
	7	1	6	1
	8	0	0	-
	9	4	16	-
	10	0	2	-
Total		127	121	5

Appendix 1. A flow chart and code for the determination of the maturity of northern fishes.

MATURITY FLOW CHART



FISH MATURITY CODE

Female

1 - Ovaries granular in texture
- hard and triangular in shape
- up to full length of body cavity
- membrane firm
- eggs distinguishable

2 - Current year spawner
- ovary fills body cavity
- eggs near full size but not loose
- not expelled by pressure

3 - Ovaries greatly extended & fill body cavity
- eggs full size and transparent
- eggs expelled by slight pressure

4 - Spawning complete
- ovaries ruptured and flaccid
- seed eggs visible
- some retained eggs in body cavity

5 - Ovary 40-50% of body cavity
- membrane thin, loose, & semi-transparent
- healed from spawning
- seed eggs apparent with few atretic eggs
- some eggs may be retained in body cavity

Unknown (virgin)

0 - canot be sexed
- gonads thin (long or short)
- transparent or translucent

Male

Immature (virgin)

6 - Testes long and thin
- tubular and scalloped shape
- up to full body length
- putty like firmness

Mature

7 - Current year spawner
- testes large and lobate
- white to purplish color
- centers may be fluid
- milt not expelled by pressure

Ripe

8 - Testes full size
- white and lobate
- milt expelled by slight pressure

Spent

9 - Spawning complete
- testes flaccid with some milt
- blood vessels obvious
- testes violet-pink in color

Resting

10 - Testes tubular, less lobate
- healed from spawning
- no fluid in center
- usually full length
- mottled and purplish in color

Unknown (non-virgin)

11 - resting fish
- has spawned but gonads regenerated
- sexing not possible